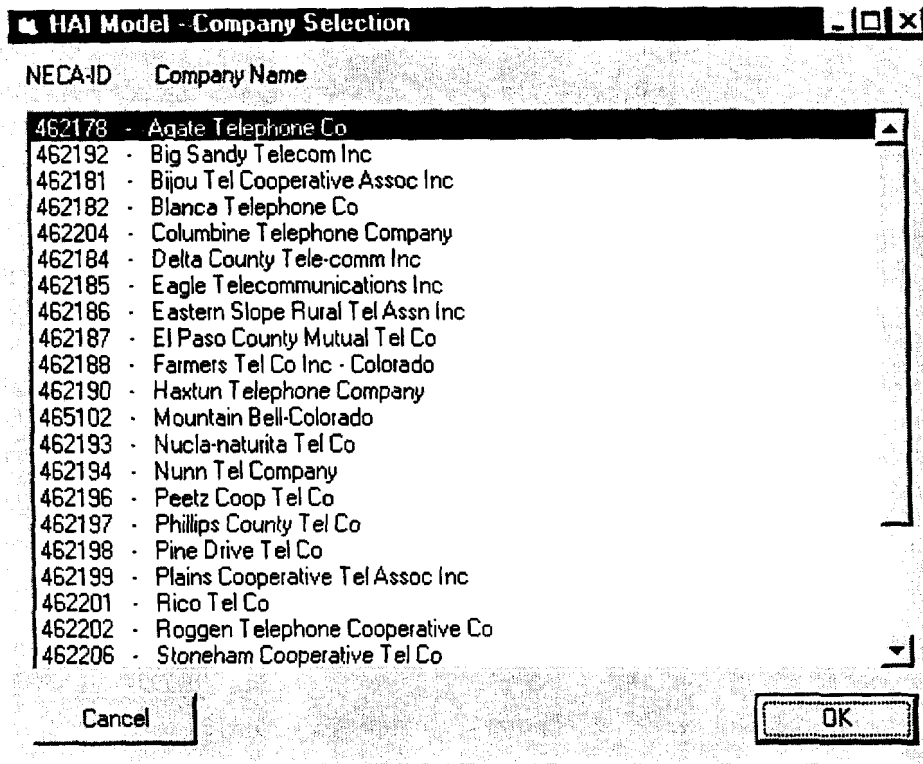


Select Company

After the State is selected, the Company Selection window will appear. This window will contain the names of all companies in the selected state for which HM 5.0a contains data. Select the appropriate company from this list.



If you have not previously run this State/Company combination under this installation of the HM 5.0a, you will be asked if you wish to create a default scenario. You should click on "OK."

Multi-Company Selection

The Multi-Company feature will provide the ability to "batch together" several companies and allows the Model to run serially the selected companies without user intervention. The results files are stored in the "Results" subdirectory of the "HM50" directory (the default path will be *c:\program files\hm50\results* under Windows 95 or Windows NT 4.0 and *c:\hm50\results* under Windows NT 3.51). The Multi-Company scenario applies the same user input values to each of the selected companies.

The Multi-Company option saves time in several ways:

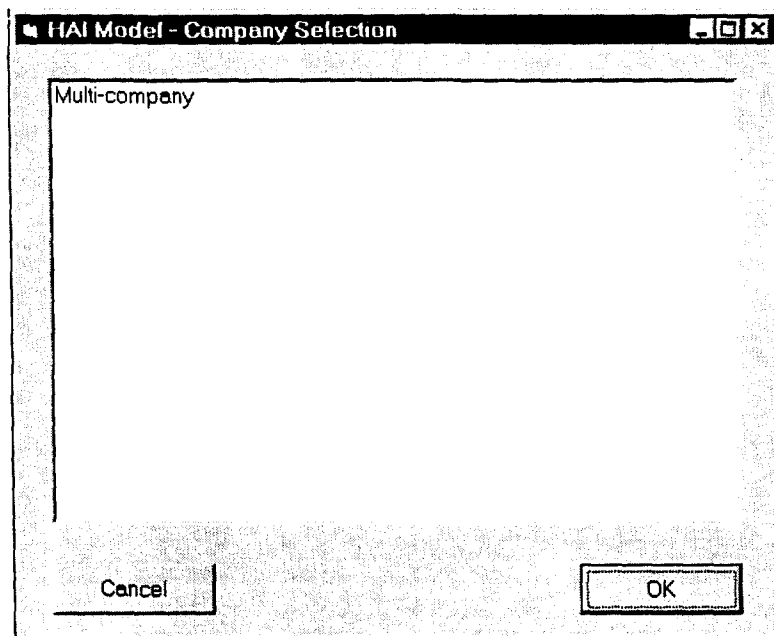
- 1) The user does not have to sit at the PC and manually run each company individually; and
- 2) If the user wishes to apply the same "non-Default" input value scenario to more than one company, he or she does not have to create the same "non-Default" scenario over and over again for each individual company. The scenario is created once, and is reused for each selected company's runs.

The user has the option, when selecting companies for a Multi-Company run, to save the workfiles resulting from each individual company's run (the default path will be *c:\program files\hm50\workfiles* under Windows 95 or Windows NT 4.0 and *c:\hm50\workfiles* under

Windows NT 3.51). Because this may use a great deal of hard drive space, the default is for the workfiles not to be saved.

The Multi-Company selection is particularly useful for running all companies in a state, especially in conjunction with the newly added "summarize" function which totals USF results from any expense modules the user selects in a given directory. This effectively establishes a template that a user may be used to set state- or region-specific factors, which differ from national defaults.

In the company selection window, select the Multi-Company option:



If you have not previously run the Multi-Company option under this installation of the HM 5.0a, you will be asked if you wish to create a default scenario. You should click on "OK." As discussed in Sections 6 and 7, below, all options are available for creating, copying, and deleting run scenarios, and selecting alternate distribution, feeder, switching, and expense modules.

Companies to be included in the Multi-Company option are selected using the Multi-Company selection option under HM Tools. This form lists all of the companies for all of the states. A solid range of entries may be selected by clicking on the first company in the range, then pressing the Shift key and clicking on the last company in the range. A collection of individual companies can be selected for a Multi-Company by pressing the Ctrl key while clicking on the company's name. A second Ctrl-click on the entry will deselect it. This form also contains a check-box for indicating whether the workfiles from the Multi-Company run should be saved.

HAI Model 5.0a
HM Tools HM Inputs

State: Multi-Company
Company: Multi-company
Scenario: Default Scenario

Module	Status	
Distribution	Pending	Reset
Feeder	Pending	Reset
Switching & IO	Pending	Reset
Expense	Pending	Reset

Run

Summarize By

- ☒ Density Zone
- ☐ Wirecenter
- ☐ CBG
- ☐ Cluster

View Expense Results

Run the Model

After the desired state and company are selected, the main window will appear.

HAI Model 5.0a
HM Tools HM Inputs

State: Colorado
Company: Mountain Bell-Colorado
Scenario: Default Scenario

Module	Status	
Distribution	Pending	Reset
Feeder	Pending	Reset
Switching & IO	Pending	Reset
Expense	Pending	Reset

Run

Summarize By

- ☒ Density Zone
- ☐ Wirecenter
- ☐ CBG
- ☐ Cluster

View Expense Results

To run the Model using default user inputs, select **Density Zone**, **Wirecenter**, **CBG**, or **Cluster** level outputs, by clicking on the appropriate button. Click **Run**. The Model will automatically calculate its four modules and produce results in the Expense Module. Finally, the Model will prompt the user to save the now-populated Expense Module workbook.

As each of the modules is calculating, a status bar will display the progress of the calculations. As each module completes, the *Status* indicator will change from *Pending* to *Complete* to indicate that it has calculated successfully.

After a particular Company has been run once, subsequent runs will show the module Status as *Complete* for all modules. To re-run the model, click the **Reset** button next to the module from which you would like to restart the Model. For example, to re-run the Expense Module, click **Reset** next to the Expense Module status indicator, and click **Run**.

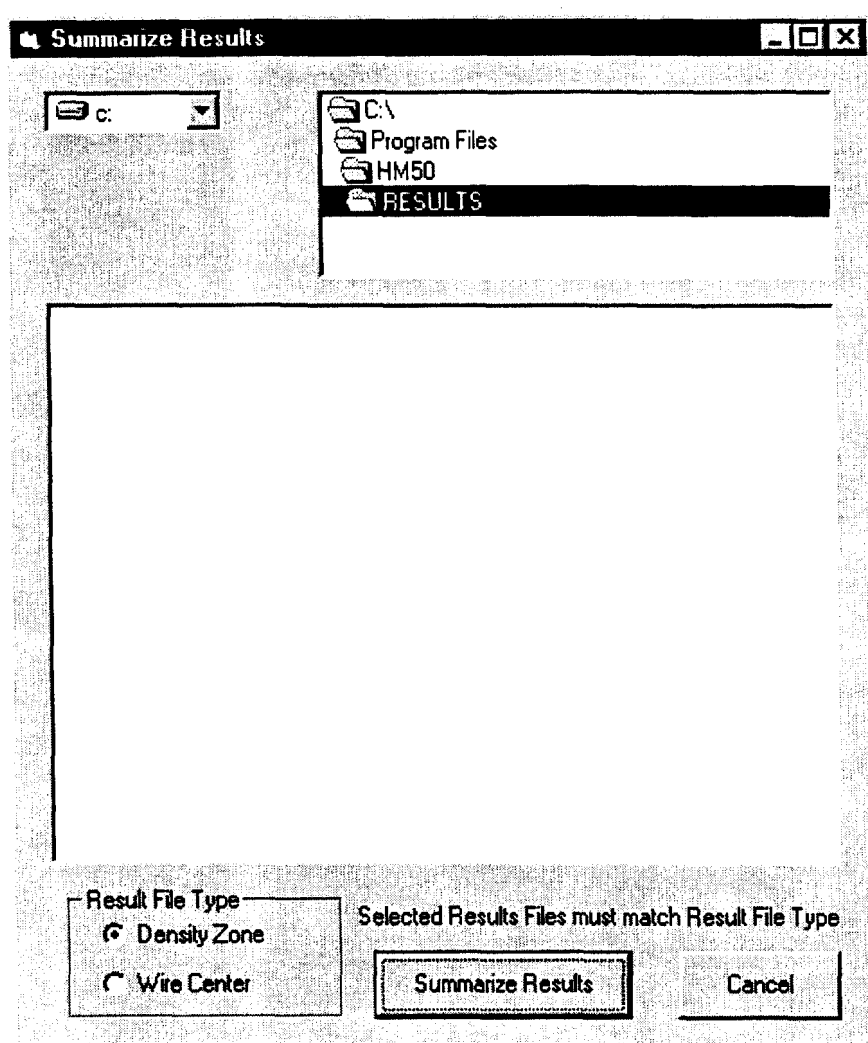
HM 5.0a results can be summarized by *Density Zone*, *Wirecenter*, *CBG*, or *Cluster*. Click on the desired option on the main window before clicking **Run**. To see all outputs, first run the Model by *Density Zone* and save the results. Next, select the *Wirecenter*, *CBG*, or *Cluster* outputs, click **Reset** next to the Expense module, and then click **Run**. The new output will be displayed.

To run the model with customized user inputs, see Section 6.

The length of computing time required to execute a run of the Hatfield Model depends both on the number of clusters and wire centers in the study area being run, and on the speed of the computer.

Summarize Results Selection

This selection, under the *HM Tools* select window, allows the user to summarize the USF results (dollars of support and lines only) for any Density Zone or Wirecenter expense modules the user targets in a given directory. When used with the Multi-Company selection, this function will give the user access to quick comparisons, based on the same user defined inputs. The select window is shown below:



The selected Results Files must match the Result File Type, either Density Zone or Wire Center file types.

6. Adjusting User Inputs and Managing Scenarios

HM 5.0a has over 1400 user adjustable inputs. The Model has input boxes that allow these inputs to be changed easily, and provides a scenario manager that allows a user to keep track of various sets of input parameters.

The *Default scenario* in HM 5.0a cannot be changed through the user interface, so a new scenario must be created before input values can be changed.⁴ To create a new scenario, select **New HM Scenario** from the **HM Tools** menu. The following input box will appear, prompting for a scenario name. The scenario can have any name up to 100 characters in length.

⁴ Sophisticated users can alter the specification of the Default Scenario by editing the pertinent input tables in the Microsoft Access database table labeled "Scenario."

HAI Model Scenario

Enter a brief description of this scenario for: Colorado - Mountain Bell-Colorado

Cancel OK

To change default inputs, click on **HM Inputs** then select the appropriate category and sub-category of inputs. An input box will appear similar to the Distribution NID input box as shown below:

NID - Colorado - Mountain Bell-Colorado

Residential NID materials, no protector	\$10.00
Residential NID Basic Labor	\$15.00
Residential Protection Block, per pair	\$4.00
Business NID case, no protector	\$25.00
Business NID Basic Labor	\$15.00
Business Protection Block, per pair	\$4.00
Indoor NID case	\$5.00

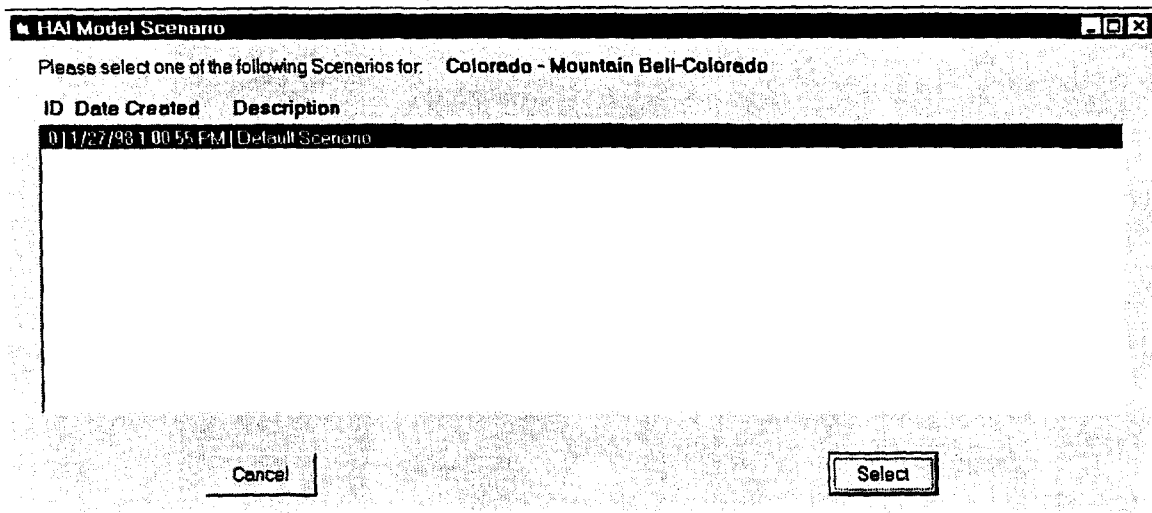
Cancel Reset Defaults OK

Inputs can be changed from default values by simply typing new values in the spaces provided. Clicking **OK** will register the input change, clicking **Reset Defaults** will return each item to its original value, and clicking **Cancel** will close the input box without registering any changes.⁵ The user may find Appendix B of the HAI Model Description useful in considering changes to the user input values. The appendix defines each user input and provides its default value, presenting them in approximately the same order as they appear in the user interface. In addition, the HAI Model Inputs Portfolio provides the rationale and support for the default value of each user input.

Once a scenario has been created, it can be modified incrementally. After the initial scenario is created, choose **Save HM Scenario As ...** from the **HM Tools** menu. An input box will appear, prompting for a new scenario name. Give the scenario a new name. The original scenario will be saved, and further changes can be made to the new scenario under its new name.

⁵ The default scenario inputs are defined in Appendix B of the Model documentation. The HM 5.0a Inputs Portfolio also defines each default-input value and provides supporting documentation for each input.

To return to a previously created scenario, choose *Open HM Scenario* from the *HM Tools* menu. The following selection box will appear, prompting the user to choose a scenario.



Up to 9,999 different scenarios can be stored in the Model for each company. However, each scenario represents hundreds of input values, so the scenario database could become quite large. Scenarios can be deleted when they are no longer needed by selecting *Delete HM Scenario* from the *HM Tools* menu. A selection box will appear which allows scenarios to be deleted.

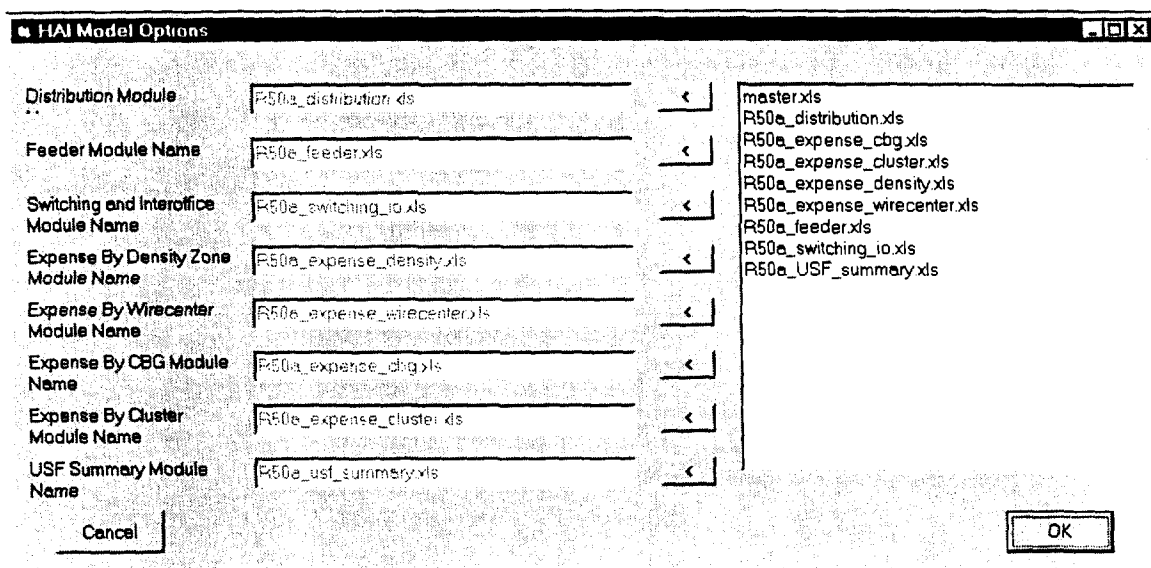
7. Additional Features

Changing Modules

If it becomes necessary to replace or update the modules that constitute HM 5.0a, the Model provides a mechanism to do so.

First, copy the new modules from the updated CD-ROM or diskette into the HM 5.0a Modules directory. (The default path will be *c:\program files\hm50\modules* under Windows 95 or Windows NT 4.0 and *c:\hm50\modules* under Windows NT 3.51.)

Next, select *Options* from the *HM Tools* menu. A selection box will appear which allows the working modules to be substituted. The right side of the selection box will show all the files that reside in the Modules directory. Select the new module from the list on the right, then click the appropriate button to send the module name to the appropriate box on the left. The module names listed on the left side of the form are the calculating modules used by the Model.



Deleting Scenario Workfiles

On certain system configurations, HM 5.0a can run up against the memory limitations of Microsoft Excel 97. This generally happens when running very large companies with completed workfiles (e.g., running Pacific Bell-CA or Southwestern Bell-TX subsequent to its initial run). If an *Out of Memory* error occurs when running a large company, click the **Delete Scenario Workfile** option on the **HM Tools** menu. This will delete the previously existing workfile (requiring the run to start from the *Distribution Module*), but should free up the required amount of memory.

8. Troubleshooting

Installation Problems

All the information contained in this section may be found in the "Readme.txt" file located in the HM 5.0 home directory.

HM 5.0a Workstation Prerequisites

The HM 5.0a is a Visual Basic application designed to run on a Windows 95, Windows NT 3.51, or Windows NT 4.0 workstation and interface with Microsoft Excel Version 97 with the Microsoft Office 97 Service Release 1 update. In addition to Excel, the "User Adjustable" inputs and other inputs to the application are maintained in a Microsoft Access 97 database that also resides on the workstation. It is not a requirement to have the MS Access software installed on the workstation, however, certain libraries must be in place for Excel to communicate with the Access database that is installed as part of the Model application.

Excel must be set up to work with MS Access.

This is an optional feature that may not have been selected when Excel was installed. If this feature of Excel was not installed, the HM 5.0 application will not function properly. The most common symptom is the Distribution Module will stall and the status message "Copying Scenario Inputs..." is displayed on the status bar. Another symptom may be a message something like "Runtime Error '424': Object Required" or another message that complains about "VBA Jet."

The most reliable way to verify that this option is installed is to rerun the Excel Setup Program and check the options listed on the Add/Remove Components form.

Another, slightly less reliable, solution is to verify the existence of a library file called "DAO350.DLL." This solution is less reliable because the Model Installation process places a copy of this file in the appropriate directory for use by the Visual Basic code. Therefore, depending on when you look for this file (before or after the HM 5.0 Installation routine), it may be in the correct directory but still not "registered" with the Windows operating system. This file will most commonly be installed in the following platform specific directories:

Win 95: C:\Program Files\Common Files\Microsoft Shared\DAO
Win NT3.51: C:\WINNT35\MSAPPS\DAO
Win NT4.0: C:\WINNT\MSAPPS\DAO

To properly install and register this feature the Excel Setup Program must be rerun. When you get to the point where you can Add/Remove Components, Click on the Add/Remove Components button. On the next form select the Converter, Filters, Data Access option. On the next form select the Data Access option. Continue from this point by clicking the appropriate "OK", "Continue", or "Next" buttons to install this option. Once the Data Access option has been installed the errors/symptoms listed above should be resolved.

HAI Model Release 5.0a

Inputs Portfolio

HAI Consulting, Inc.

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Boulder, Colorado 80303

January 27, 1998

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HAI Model Release 5.0a Inputs Portfolio

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1. OVERVIEW

This draft document contains descriptions of the user-adjustable inputs to the HAI Model, version 5.0a ("HM5.0a"), the default values assigned to the inputs, and the rationales and supporting evidence for these default values. The inputs and assumptions in HM5.0a are based on information in publicly available documents, expert engineering judgment, or price quotes from suppliers and contractors.

Prices of telecommunications equipment and materials are notoriously difficult to obtain from manufacturers and large sales organizations. Although salespeople will occasionally provide "ballpark" prices, they will do so only informally and with the caveat that they may not be quoted and the company's identity must be concealed. It is very nearly impossible to obtain written, and hence "citable," price quotations, even for "list" prices, from vendors of equipment, cable and wire, and other items that are used in the telecommunications infrastructure. Part of the reason for this is that the vendors have long-standing relationships with the principal users of such equipment, the incumbent local exchange carriers ("ILECs"), and they apparently believe that public disclosure of any prices, list or discounted, might jeopardize these relationships. Further, they may fear retaliation by the ILECs if they were to provide pricing explicitly for use in cost models such as HM5.0a¹. The HM5.0a developers thus have often been forced to rely on informal discussions with vendor representatives and personal experience in purchasing or recommending such equipment and materials. Nevertheless, a great deal of experience and expertise in the industry underlies the estimates, where they were necessary to augment explicit, publicly-available information.

This document contains a number of graphs that illustrate a range of prices for particular kinds of telecommunications equipment. The information contained in these graphs was gathered to validate the opinions of outside plant experts who used their collective industry knowledge and experience to estimate the costs of particular items.

This document will continue to evolve as more documented sources are found to support the input values and assumptions.

Organization of Material:

Material is generally organized in this binder in the same order as default values appear in Model Input screens in the HAI Model.

¹ See, for example, "U S West to Suppliers: Back Us or Lose Business," *Inter@ctive Week*, September 16, 1996.

2. DISTRIBUTION

2.1 Network Interface Device (NID)

Definition: The investment in the components of the network interface device (NID), the device at the customers' premises within which the drop wire terminates, and which is the point of subscriber demarcation. The residence NID is assumed to have a capacity for 2 lines, and the business NID is assumed to have a capacity for 6 lines. The NID investment is calculated as the cost of the NID case plus the product of the protection block cost per line and the number of lines terminated.

Default Values:

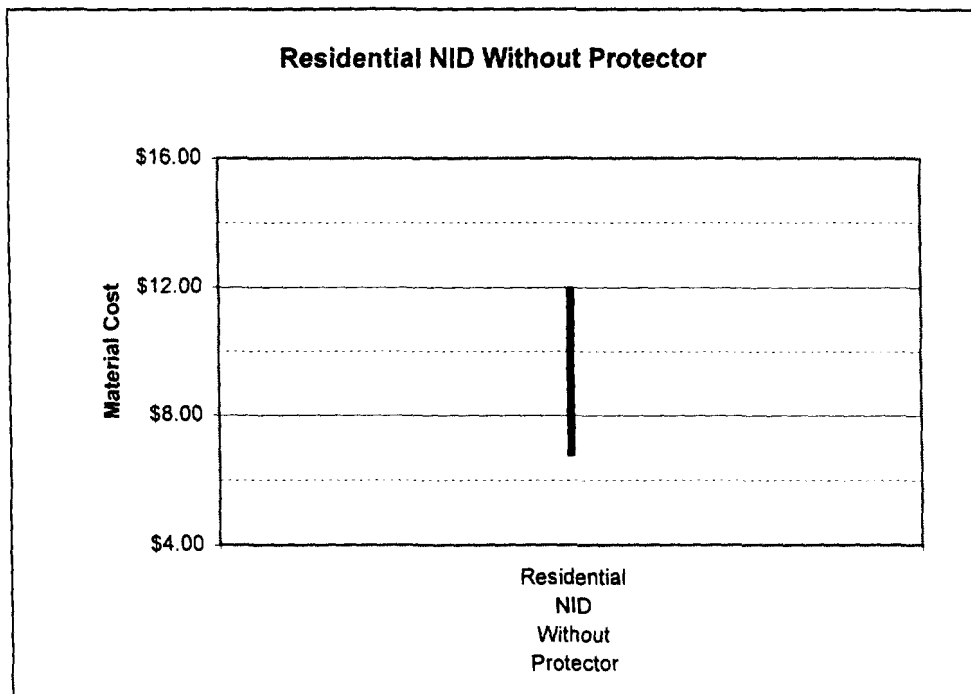
NID Materials and Installation	
	Cost
Residential NID case, no protector	\$10.00
Residential NID basic labor	<u>\$15.00</u>
Installed NID case	\$25.00
Protection block, per line	\$4.00
Business NID case, no protector	\$25.00
Business NID basic labor	<u>\$15.00</u>
Installed NID case	\$40.00
Protection block, per line	\$4.00
Indoor NID Case	\$5.00

Support:

a) Residential NID Cost without Protector

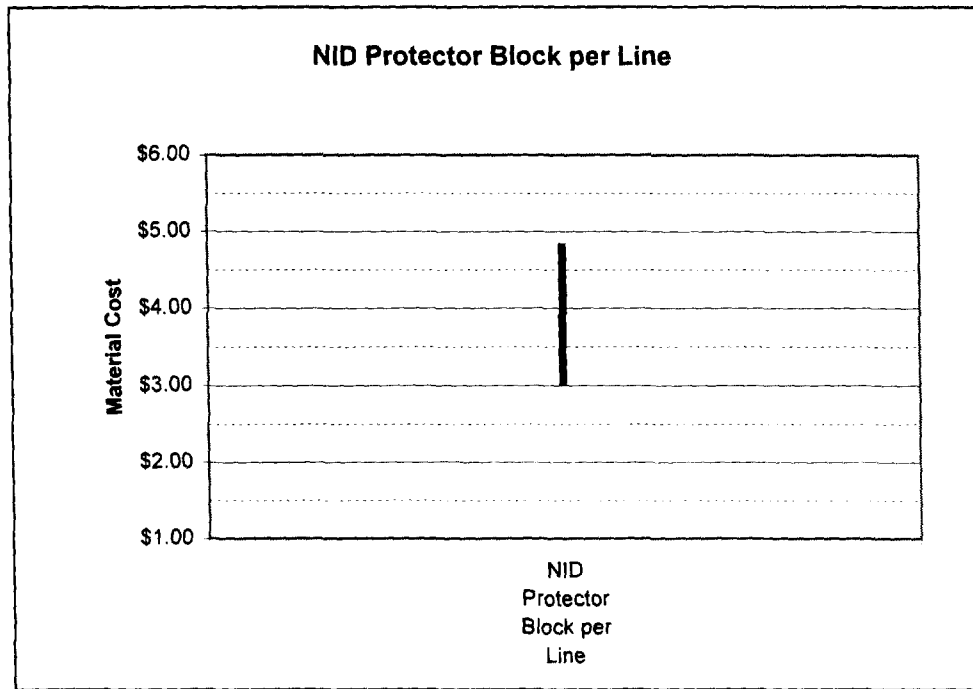
The labor estimate assumes a crew installing network interface devices throughout a neighborhood (in coordination with the installation of drops, terminals, and distribution cables). A work time of 25 minutes was used, based on the opinion of a team of outside plant experts. A loaded labor rate of \$35 per hour excludes exempt material loadings which normally include the material cost of the NID and Drops. A residential NID shell has capacity for two protectors.

Price quotes for material were received from several sources. Results were as follows:



b) NID Protection Block per Line

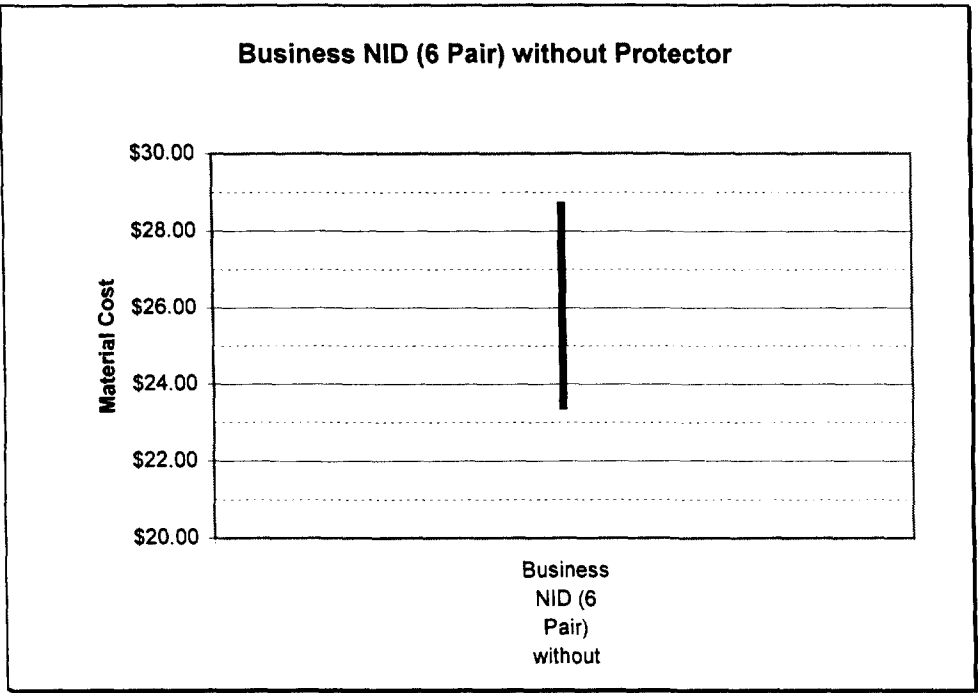
Price quotes for material were received from several sources. Results were as follows:



c) Business NID - No Protector

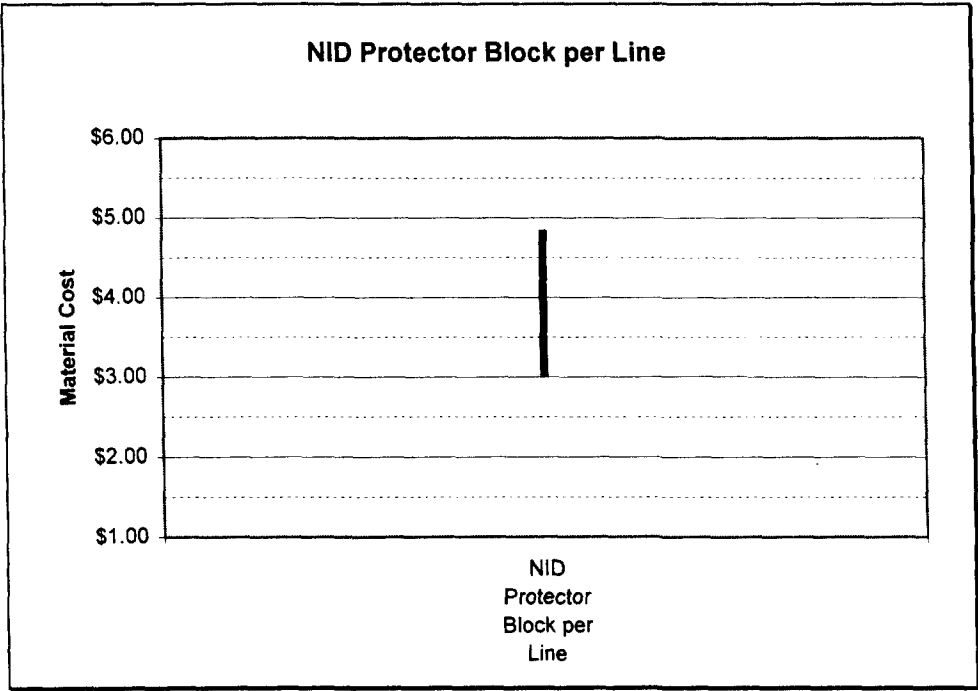
The labor estimate assumes a crew installing network interface devices throughout a neighborhood (in coordination with the installation of drops, terminals, and distribution cables). A work time of 25 minutes was used, based on the opinion of a team of outside plant experts. A loaded labor rate of \$35 per hour excludes exempt material loadings which normally include the material cost of the NID and Drops. A business NID shell has capacity for six protectors.

Price quotes for material were received from several sources. Results were as follows:



d) NID Protection Block per Line

Price quotes for material were received from several sources. Results were as follows:



e) Indoor NID Case

Used for subscribers located in high-rise buildings. This is the investment in the NID that serves as the demarcation between subscriber wiring and network facilities. The indoor NID does not contain overvoltage protection devices; investment for these is included in the indoor SAI investment.

2.2. DROP

2.2.1. Drop Distance

Definition: The average length of a drop cable in each of nine density zones. The drop extends from the NID at the customer's premises to the block terminal at the distribution cable that runs along the street or the lot line.

Default Values:

Drop Distance by Density	
Density Zone	Drop Distance, feet
0-5	150
5-100	150
100-200	100
200-650	100
650-850	50
850-2,550	50
2,550-5,000	50
5,000-10,000	50
10,000+	50

Support: The HAI Model (HM) 5.0a assumes that drops are run from the front of the property line. House and building set-backs therefore determine drop length. Set-backs range from as low as 20 ft., in certain urban cases, to longer distances in more rural settings. While HM 5.0a assumes that lot sizes are twice as deep as they are wide, it is assumed that houses and buildings are normally placed towards the front of lots. Reasons for this include the cost of asphalt or cement driveways, unwillingness to remove snow from extremely long driveways in non-sunbelt areas, and the fact that private areas and gardens are usually situated in the backyard of a lot.

It should be noted that although exceptions to drop lengths may be observed, the model operates on average costs within density zones. The last nationwide study of actual loops produced results indicating that the average drop length is 73 feet.²

2.2.2. Drop Placement, Aerial and Buried

Definition: The total placement cost by density zone of an aerial drop wire, and the cost per foot for buried drop cable placement, respectively.

² Bellcore, *BOC Notes on the LEC Networks - 1994*, p. 12-9.